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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/961,208	09/24/2001	Takashi Imamura	Q66342	6241

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SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, DC 20037-3202

EXAMINER	
KRONENTHAL, CRAIG W	

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/961,208	IMAMURA ET AL.	
	Examiner	Art Unit	
	Craig W. Kronenthal	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☒ Claim(s) *16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 September 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed February 9, 2005, has been entered and made of record.

2. The examiner acknowledges the claim for foreign priority and confirms that the certified copy of the priority document has been received.

Response to Arguments

3. Applicant's arguments, see p. 11-13, with respect to the rejection(s)of claim(s) 1, 7, 8, and 14 under Katsuragawa et al. (PN 5,319,549) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Nishikawa et al. (PN 5,598,481).

4. Applicant's arguments with respect to claims 2 and 9 have been fully considered but they are not persuasive. Applicant argues in essence that the recording conditions are separate from read-out conditions. The examiner disagrees and indicates that the read-out sensitivity (S) (Equation 12) is a function of Sk (Equation 13), which is a function of x-ray source voltage and dosage (col. 10 line 59 – col. 11 line 12).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., recording conditions being separate from read-out conditions) are not recited in the

rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Claim Objections

5. Claim 16 is objected to because of the following informalities:

- Claim 16 currently depends on claim 8, but should depend on claim 9.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 7, 8, 14, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishikawa et al (P.N. 5,598,481). (hereinafter Nishikawa)

Regarding Claim 1: Nishikawa discloses a method of detecting an abnormal pattern candidate, in which a microcalcification pattern candidate embedded in an object image

is detected as an abnormal pattern candidate and in accordance with image information representing the object image, the method comprising the steps of:

- performing processing, in which a first shape-dependent filter in accordance with a shape of microcalcification pattern is utilized, on the object image, a fine structure image, which illustrates a fine structure area embedded in the object image, being thereby formed [Figure 22B. A noise reduction filter is used as part of a preprocessing technique for detecting calcifications (col. 21 lines 26-29). The noise reduction filter eliminates noise but does not effect small structures thereby creating a fine structure image (col. 21 lines 23-24).],
- Performing enhancement processing, in which a second shape-dependent filter in accordance with the shape of the microcalcification pattern is utilized, on the fine structure image, an enhancement-processed image, in which the microcalcification pattern has been enhanced, being thereby formed [Figure 11A shows the signal-enhanced image which is included in Figure 22B's Linear Filtering. Linear spatial filters are used to form the signal-enhanced image (col. 16 lines 18-21 and 34-37).],
- Detecting the microcalcification pattern candidate by use of the enhancement-processed image [The signal-enhanced image is used in a subtraction process to create a difference image, which is then thresholded to identify microcalcifications (col. 16 lines 18-26).].

Regarding Claim 7: Nishikawa discloses the method in claim 1 wherein the first shape-dependent filter is a morphological filter.[The noise reduction filter is the combination of morphological erosion and dilation operators (col. 21 lines 15-19).].

Regarding Claim 8: The analogous arguments of claim 1 are applicable to claim 8.

Regarding Claim 14: The analogous arguments of claim 7 are applicable to claim 14.

Regarding Claim 17: Nishikawa discloses the method of claim 1, wherein the first shape-dependent filter is a morphological filter and the second shape-dependent filter represents an image density pattern of the microcalcification pattern [Nishikawa's noise reduction filter which implements morphological erosion and dilation operators corresponds to the first shape-dependent filter (col. 21 lines 15-19). Nishikawa's spatial filters (Figures 12(a) – 12(c) and 13(a) – 13(f)), which are used for enhancing candidate microcalcifications, represent image density patterns (col. 8 lines 41-45) and therefore correspond to the second shape-dependent filter (col. 17 lines 19-40).].

Regarding Claim 18: Nishikawa discloses the method of claim 1, wherein the first shape-dependent filter is a morphological filter and the second shape-dependent filter represents an image density gradient of the microcalcification pattern [Nishikawa's noise reduction filter which implements morphological erosion and dilation operators corresponds to the first shape-dependent filter (col. 21 lines 15-19). Nishikawa's spatial

filters (Figures 12(a) – 12(c) and 13(a) – 13(f)), which are used for enhancing candidate microcalcifications, represent image density patterns (col. 8 lines 35-40) and therefore correspond to the second shape-dependent filter (col. 17 lines 19-40).].

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2, 3, 9, 10, 15, 16, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa in view of Takeo et al. (P.N. 5,714,764). (hereinafter Takeo)

Regarding Claim 2: Image recording conditions yield corresponding read-out conditions such as sensitivity and latitude. Therefore, the argument below regarding claim 3 also holds for the image recording conditions.

Regarding Claim 3: Nishikawa discloses the method as defined in claim 1 for reasons explained above, but does not disclose the following, which is instead disclosed by Takeo:

- A plurality of second shape-dependent filters, which conform to different read-out conditions at the time of object image acquisition, are prepared for the respective read-out conditions,

  Takeo describes the creation of a conversion table, which holds read-out conditions such as sensitivity and latitude (col. 12 lines 5-8)

- A second shape-dependent filter, which conforms to the read-out conditions of the object image to be processed, is selected from the plurality of the second shape-dependent filters having been prepared,

  Takeo explains that the conversion process involves a fiter, which utilizes the above mentioned conversion table (col. 12 lines 9-16).

- The enhancement processing is performed by use of the thus selected second shape-dependent filter (col. 11 lines 29-39). The read-out conditions are adjusted to aid in the enhancement of an image. Therefore it is understood that the conversion process is an enhancement process.

One skilled in the art would be motivated to modify Nishikawa with the teachings of Takeo to create a more specialized filtering procedure so that abnormal regions may be more accurately detected with fewer false-positives, particularly in cases where the image signal change is large (col. 13 lines 45-57).

Regarding Claim 10: The same reasons for rejection apply for this claim as in claim 3 above.

Regarding Claim 9: The same reasons for rejection apply for this claim as in claim 2 above.

Regarding Claim 15: Takeo discloses the method of claim 2, wherein the image recording condition is one of a tube voltage of a radiation source, a radiation dose, a compression force and a compression thickness [The read-out sensitivity (S) (Equation 12) is a function of Sk (Equation 13), which is a function of x-ray source tube voltage and radiation dosage (col. 10 line 59 – col. 11 line 12).

Regarding Claim 16: The analogous arguments of claim 15 are applicable to claim 16.

Regarding Claim 19: Nishikawa discloses the method of claim 1, but does not disclose optimization with respect to a recording apparatus or read-out apparatus. However, Takeo discloses a method for detecting microcalcifications wherein the second shape-dependent filter is optimized with respect to an image recording apparatus and an image read-out apparatus [A conversion table for optimizing an enhanced image based on read-out and recording conditions such as sensitivity and latitude (col. 12 lines 1-16).] It would have been obvious to one of ordinary skill in the art to modify Nishikawa's experimental filtering (col. 17 line 61 – col. 20 line 52) with Takeo's conversion table for

filter optimization. One of ordinary skill in the art would be motivated to make this modification to reduce computation time since Takeo's conversion table allows for automatic processing. Additionally, one would be motivated to modify Nishikawa with Takeo, particularly when the input signal change is large (col. 13 lines 45-57).

Regarding Claim 20: The analogous arguments of claim 19 are applicable to claim 20.

10. Claims 4, 5, 6, 11, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa in view of Doi et al. (P.N. 4,907,156). (hereinafter Doi)

Regarding Claim 4: Nishikawa discloses the method as defined in claim 1 for reasons explained above, but does not disclose the following, which is instead disclosed by Doi:

- A plurality of second shape-dependent filters, which conform to different contrasts of microcalcification patterns embedded in object images, are prepared for the respective contrasts,

  Doi explains that multiple matched filters are created with Fourier spectrums proportional to simulated nodules of a given size and contrast (col. 5 lines 8-10). It should be noted that the SNR-maximizing filter used by Doi enhances the microcalcification or abnormal regions (col. 4 lines 62-65).

- A second shape-dependent filter, which conforms to the contrast of the microcalcification pattern embedded in the object image to be processed, is selected from the plurality of the second shape-dependent filters having been prepared,

    Doi cites an example in which a matched filter is chosen partially because it conforms to the contrast of a microcalcification pattern embedded in an image (col. 5 lines 15-28).

- The enhancement processing is performed by use of the thus selected second shape-dependent filter. (col 5 lines 26-28)

One skilled in the art would be motivated to modify Nishikawa with the teachings of Doi to create a more specialized filtering procedure so that abnormal regions may be more accurately detected with fewer false-positives.

Regarding Claim 5: Nishikawa discloses the method as defined in claim 1 for reasons explained above, but does not disclose the following, which is instead disclosed by Doi:

- A plurality of second shape-dependent filters, which conform to different sizes of microcalcification patterns embedded in object images, are prepared for the respective sizes,

    According to Doi, "it is necessary to find a few matched filters, or perhaps just one, which will enhance, to some degree, nodules of various sizes and shapes" (col 5 lines 4-6). Doi explains that multiple matched filters are created with Fourier spectrums proportional to simulated nodules of a

given size and contrast (col. 5 lines 8-10). It should be noted that the SNR-maximizing filter used by Doi enhances the microcalcification or abnormal regions (col. 4 lines 62-65).

- A second shape-dependent filter, which conforms to the size of the microcalcification pattern embedded in the object image to be processed, is selected from the plurality of the second shape-dependent filters having been prepared,

  Doi cites an example in which a matched filter is chosen partially because it conforms to the size of a 9mm nodule embedded in an image (col. 5 lines 15-28).

- The enhancement processing is performed by use of the thus selected second shape-dependent filter. (col 5 lines 26-28)

One skilled in the art would be motivated to modify Nishikawa with the teachings of Doi to create a more specialized filtering procedure so that abnormal regions may be more accurately detected with fewer false-positives.

Regarding Claim 6: Nishikawa discloses the method as defined in claim 1 for reasons explained above, but does not disclose the following, which is instead disclosed by Doi:

- A plurality of second shape-dependent filters, which conform to different combinations of image recording conditions at the time of object image acquisition, read-out conditions at the time of object image acquisition, contrasts of microcalcification patterns embedded in object images, and sizes

of microcalcification patterns embedded in object images, are prepared for the respective combinations,

According to Doi, "it is necessary to find a few matched filters, or perhaps just one, which will enhance, to some degree, nodules of various sizes and shapes" (col 5 lines 4-6). Doi explains that multiple matched filters are created with Fourier spectrums proportional to simulated nodules of a given size and contrast (col. 5 lines 8-10). These matched filters represent combinations of size and contrast, but it is obvious that filters of other combinations could be created. It should be noted that the SNR-maximizing filter used by Doi enhances the microcalcification or abnormal regions (col. 4 lines 62-65).

- A second shape-dependent filter, which conforms to the combination with respect to the object image to be processed, is selected from the plurality of the second shape-dependent filters having been prepared,

  Doi cites an example in which a matched filter conforming to a 9 mm nodule is chosen because it provides the best balance of size and contrast (col. 5 lines 15-28).

- The enhancement processing is performed by use of the thus selected second shape-dependent filter. (col. 5 lines 26-28)

One skilled in the art would be motivated to modify Nishikawa with the teachings of Doi to create a more specialized filtering procedure so that abnormal regions may be more accurately detected with fewer false-positives. It is also obvious to one skilled in the art

of filtering that a greater number of filter combinations available, allows for greater customization and therefore more accurate results.

Regarding Claim 11: The same reasons for rejection apply for this claim as in claim 4 above.

Regarding Claim 12: The same reasons for rejection apply for this claim as in claim 5 above.

Regarding Claim 13: The same reasons for rejection apply for this claim as in claim 6 above.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig W. Kronenthal whose telephone number is (571) 272-7422. The examiner can normally be reached on 8:00 am - 5:00 pm / Mon. - Fri..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (571) 272-7414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

06/22/05
CWK

AMELIA M. AU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600